Northwest CruiseShip Association
Discharge of Effluents in Certain Alaska Waters by Cruise Vessel Operations

2004 Operating Season
Quality Assurance/Quality Control Plan
For
Sampling and Analysis of Treated Sewage and Graywater
From
Commercial Passenger Vessels

Submitted to fulfill certain requirements of
33 CFR 159 United States Title 33 Code of Federal Regulations Part 159 and Alaska Statute 46.03.460 – 46.03.490 and 18 AAC 69

TABLE OF CONTENTS

2004 QA/QCP
Revision 3, Date: January 28, 2004
Page 4 of 32

APPROVAL PAGE

John Hansen, President NWCA
NorthWest Cruiseship Association

Signature Feb 16, 2004 Date

David Wetzel
Lab Project Manager

Signature 2/4/04 Date

Lisa Hoferkamp
Project Quality Assurance Officer

Signature 3-25-04 Date

John Sifling, Commander
U.S. Coast Guard Captain of the Port

Signature 4/5/04 Date

Denise Koch
ADEC Project Manager

Signature 2/20/04 Date

Ron Klein
ADEC Water Quality Monitoring and Assessment Program Manager
(Acting QA Officer)

Signature 2/26/04 Date

Revision Number ___
Revision Date: _____

This document control information will appear in the upper right corner of each page of the Quality Assurance/Quality Control Plan (QA/QCP). Each revision of the QA/QCP will be assigned a revision number obtained by adding 1 (one) to the previous revision number.

On the bottom of each page will be found:
Cruise Ship Wastewater Monitoring # Quality Assurance/ Quality Control Plan

Distribution List

A copy via electronic format of each revision will be distributed to the following individuals:

Individual	**Organization**
John Sifling	U.S. Coast Guard COTP
Denise Koch	ADEC Project Manager
David Wetzel	Analytica Alaska
Amy Randolph	Analytica Alaska
Ron Klein	ADEC Water Quality Monitoring and
Vessel Representatives	To be determined
John Hansen	NorthWest Cruise Ship Association

Acronyms/Abbreviations Used

ADEC	Alaska Department of Environmental Conservation
BNA	Base/Neutrals, Acids
BOD	Biochemical Oxygen Demand – 5-day test
CFR	Code of Federal Regulations
COC	Chain of Custody
COD	Chemical Oxygen Demand
COTP	US Coast Guard Captain of the Port
DQO	Data Quality Objective
EPA	Environmental Protection Agency
HDPE	High Density Polyethylene
HCl	Hydrochloric Acid
H_2SO_4	Sulfuric Acid
HNO_3	Nitric Acid
MDL	Method Detection Limit
MSD	Marine Sanitation Device
NaOH	Sodium Hydroxide
%R	Percent Recovery
PQL	Practical Quantitation Limit (Minimum Reporting Level)
QA	Quality Assurance
QA/QCP	Quality Assurance/Quality Control Plan
QMP	Quality Management Plan
QC	Quality Control
RPD	Relative Percent Difference
RQ	Reportable Quantity per 40 CFR part 302
SM	Standard Methods
SW-846	Solid Waste Methods
SOP	Standard Operating Procedures
TSS	Total Suspended Solids
USCG	U.S. Coast Guard
VOCs	Volatile Organic Chemicals
VSSP	Vessel Specific Sampling Plan

Management and Contractors

North West CruiseShip Association

The North West CruiseShip Association (NWCA) represents the large cruise line companies undergoing wastewater testing during the 2004 Alaska cruise ship season. Individual NWCA members are funding the sampling and analysis program for their own respective vessels. All NWCA member line cruise ships that operate in Alaska waters in 2004 will follow the provisions of this QA/QCP.

Individual Vessel Representatives

The responsibility for adherence to the provisions of this QAQC plan rests with the owner or operator. Failure of vessel owners and operators to follow the provisions of this QAQC plan will result in enforcement action by the State of Alaska.

Small Cruise Ships and Alaska Marine Highway System

Many other small cruise ship companies and the Alaska Marine Highway System (AMHS) may choose to follow this QA/QCP or they may submit their own QA/QCP to the ADEC in order to satisfy obligations under Alaska Statute 46.03.465(b) and 18 AAC 69.025.

Lab Project Manager

The Lab Project Manager is responsible for ensuring that individual project components are executed in a timely and appropriate fashion. However it is the vessel owner or operator that is responsible for compliance. Responsibilities include:

- Submitting results within the time frame specified by law and this document.
- Communicating project information to the Coast Guard, ADEC, and cruise lines.
- Assuring that project participants have necessary training.
- Fielding questions and requests for information that arise during and after the project.
- Managing the financial aspect of the project, including the determination of billing and payment mechanisms.

Sampling team

All sampling, both planned and unplanned, will be coordinated and conducted by the contract sampling team. VSSP must be submitted by the vessel owner or operator to the ADEC and Coast Guard prior to sampling.[1] A sampling schedule will be designed and kept confidential. Vessel operators will not be aware of the timing of sample collection for the two unannounced sampling events.

Samplers are responsible for sample collection, sample integrity and custody, field measurements, and accurate notes. THE SAMPLER MUST VERIFY THAT THE

[1] ADEC: 21 days before sampling, 18 AAC 69.030
Coast Guard: w/in 30 days of initial entry, 33 CFR 159.317(a)(3)

VESSEL IS DISCHARGING DURING THE UNANNOUNCED SAMPLES. If discrepancies exist on the VSSP, the sampler is to report them immediately to ADEC and the USCG. The sampler will provide a compilation of field notes, deviations from VSSP or QA/QCP plans (if applicable), and Chain of Custody to the laboratory personnel, Project Manager, and the Project Quality Assurance Officer upon completion of all sampling.

The sampler will notify the ADEC project manager 36 hours prior to the sampling event. This gives ADEC time to audit the sampling event.

Wastewater analysis laboratory

A laboratory, certified for drinking water analysis by ADEC, will be retained to analyze both conventional and priority pollutant samples according to their individual laboratory Quality Assurance Plan, and using EPA-approved analytical methods. If a sub-contract laboratory is used to meet holding times, that sub-contract laboratory must also be certified for drinking water analysis by ADEC and adhere to the quality control procedures outlined in this document. The laboratory Quality Assurance Manager will certify the quality assurance programs of all subcontract laboratories. A list of ADEC certified microbiological labs is available at http://info.dec.state.ak.us/eh/dwww/labs.htm Labs that provide chemical analysis can be found at http://info.dec.state.ak.us/eh/lab/certchemlabs.aspx

Project Quality Assurance Officer

The Project Quality Assurance (QA) Officer is an independent individual that ensures that that ALL laboratories and sampling teams follow the laboratory's quality assurance program guidelines, this QA/QCP, and the VSSP. The Project QA Officer works independently to ensure quality of the data.

US Coast Guard COTP

The USCG COTP will use data gathered in accordance with this plan to determine compliance with federal law.

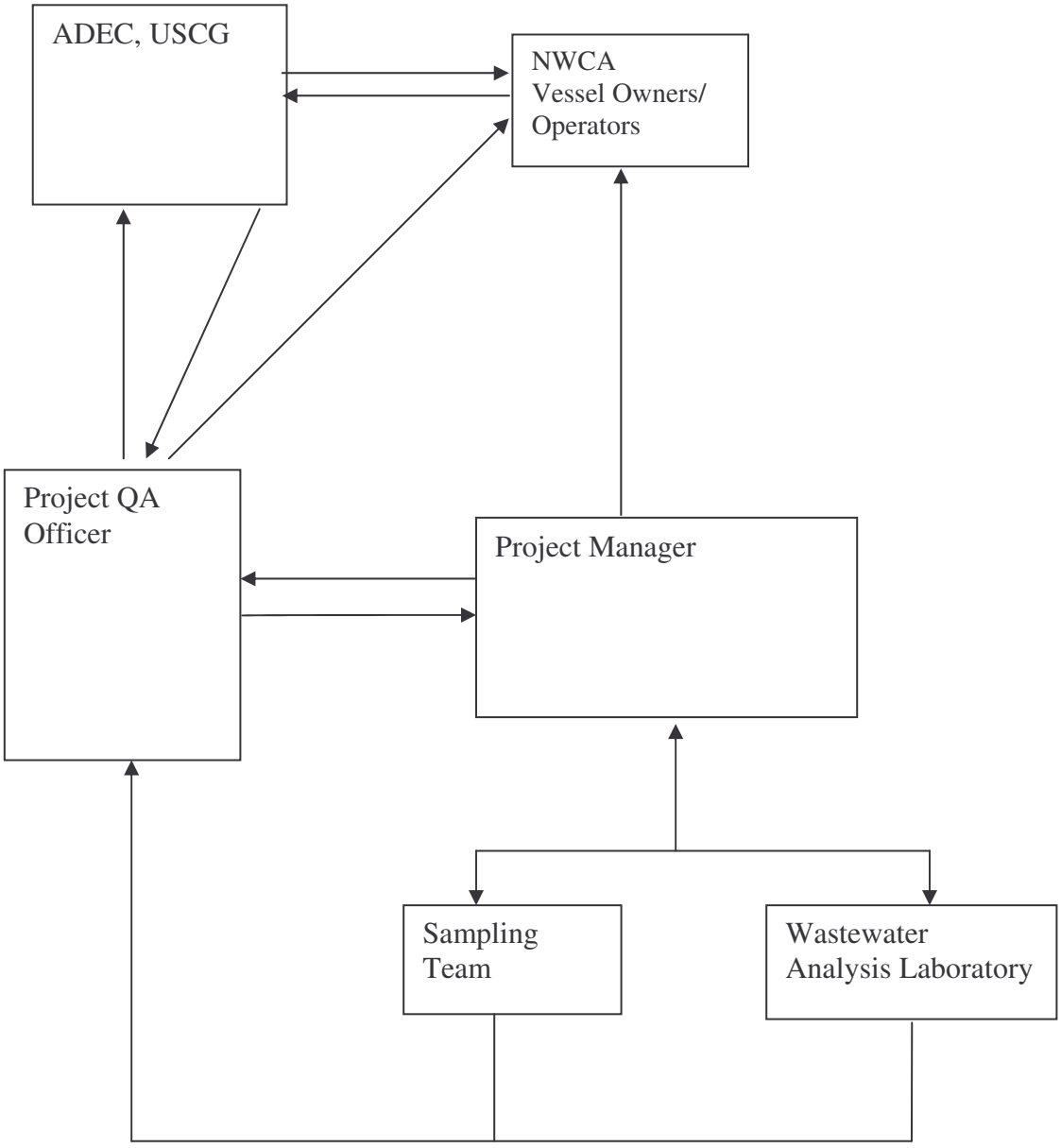
ADEC Project Manager

The ADEC project manager manages the program to meet the requirements in the Alaska statute, regulation, and the approved QA/QC plan.

ADEC Water Quality Assurance Officer

The ADEC Water Quality Assurance Officer will review the QA/QCP to determine if it meets the State of Alaska's objectives for the data collection effort. The ADEC WQA Officer may review data results and participate in sampling and laboratory audits.

2004 Program Organizational Chart



Purpose

This document is prepared and submitted to fulfill requirements of United States Title 33 Code of Federal Regulations Part 159.317, Alaska Statute 46.03.460- 46.03.490, and 18 AAC 69.025. Both the federal and the state law require at least two **sampling events** per vessel in a season. A "sampling event" is the collection of representative samples[2] of each wastewater type being discharged within Alaska waters. The number of samples in a sampling event is based upon the ship configuration, vessel wastewater management practices, and the wastewater quantities discharged while the sample team is on-board.

The two unannounced samples must be taken at a point in the system directly before being discharged overboard. Sample ports must be within 50 feet of the point of overboard discharge.[3]

One sample will be tested for conventional pollutants only. The second sample must be tested for conventional and priority pollutants.

Samples submitted to the USCG in order to obtain certification for continuous discharge must also follow this QA/QCP.

Lab reports should clearly state whether the sampling was conducted

- to obtain certification for continuous discharge,
- to maintain continued compliance for continuous discharge, or
- to satisfy 33 CFR 159.317 and AS 46.03.465.

The lab will submit the sample results directly to the DEC and USCG, but the owner/operator is responsible for meeting submittal deadlines.

Applicability

This QA/QCP specifies the minimum requirements for sampling and analysis of treated sewage and/or graywater and other wastewaters as defined in AS 46.03.490, for the 2004 Alaska operating season for vessels that are members of the North West CruiseShip Association. This QA/QCP is also applicable for any commercial passenger vessel that discharges treated sewage, graywater and/or other wastewater in the applicable waters of Alaska as defined in 33 CFR 159.305 and the waters of the Alexander Archipelago as defined in AS 46.03.490. All unannounced and/or random sampling events required by 33 CFR 159 and AS 46.03 shall be conducted in accordance with this QA/QCP.

Owner or operators must comply with the guidelines in 33 CFR 159, 40 CFR 136.3, AS 46.03.460-46.03.490, and 18 AAC 69, 18 AAC 70 and this plan.

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[2] The VSSP for each vessel will list the proper location and timing of wastewater sampling. The samples will be taken in a manner that seeks to capture a typical wastewater discharge while still meeting the fecal coliform 6-hour holding time.

[3] Samples taken at the treatment system are sometimes of different quality than the samples taken at the discharge port. This will make it possible to fairly compare the data from all ships.

Applicable standards for wastewater discharges[4]
FOR VESSELS DISCHARGING at least 1 nautical mile from shore and traveling a minimum of 6 knots

Pollutant limits	Black	Graywater
Total Suspended Solids (TSS)	150 mg/L	150 mg/L
Fecal Coliform	200 MPN/100ml	200 MPN/100ml

Each participating ship will be sampled within 30 days of initial entry into Alaska waters and subject to unannounced treated sewage and graywater sampling and analysis for conventional and priority pollutants as determined by the Coast Guard COTP. The ADEC may board vessels to perform sampling inspections as necessary to implement AS 46.03.

This QA/QCP covers sampling and analysis for the parameters listed below. Analysis for conventional pollutant parameters required by ADEC under AS 46.403.465 is noted by an asterisk (*). ADEC also requires analysis of priority pollutant parameters under AS 46.403.465. A sample that fails to provide valid results for all required pollutants as indicated by an asterisk will not be counted as an acceptable sample for purposes of meeting the minimum requirement of two samplings for conventional pollutants.

Conventional pollutants (two sampling events):
- Total Suspended Solids (TSS)*
- Settleable Solids (SS)
- Biochemical Oxygen Demand (BOD)*
- Chemical Oxygen Demand (COD)*
- Oil and Grease
- Total Organic Carbon
- Ammonia – Total*
- Fecal Coliform*
- pH*
- Total and Free Residual Chlorine*
- Specific Conductance (to measure seawater influx)
- Alkalinity
- Total Nitrogen (Ammonia, Nitrate, Nitrite, and Total Kjeldahl Nitrogen (TKN))
- Total Phosphorus

Priority Pollutants (one sampling event)
- Base/Neutrals, Acids
- Volatile Organic Chemicals (VOCs)
- Trace Metals (Total Recoverable and Dissolved)

[4] According to Title XIV, 33 CFR 159, 40 CFR 140, and AS 46.03.463

BLIND DUPLICATE SAMPLES

Blind sample duplicates will be collected on a minimum of 10% of the total number of samples or four samples total, whichever number is greater. All blind samples will be analyzed for conventional pollutants, but only half will be analyzed for priority pollutants.

The purpose of the blind sample duplicates is to assess sampling and laboratory error and to assess overall method variability. Precision between the sample and its duplicate will be determined by calculating the relative percent difference between the two samples, in the same way that precision is measured between two laboratory-fortified blanks or a matrix spike/matrix spike duplicate. The use of duplicate samples extends the test of precision to the sampling method itself. The use of blind samples provides a test of the laboratory and is used to assess bias or analytical errors not detected by the laboratory (e.g., a false positive). The samples will be analyzed by the same lab and for the same parameters.

The sampler will need to take a cube (10 liters) of wastewater and thoroughly mix it. The sampler should then pour the contents into individual sample bottles.

Quality Objectives and Criteria for Measurement Data

Data Quality Objectives (DQOs) are quantitative and qualitative objectives that define usable data for meeting the requirements of this project. DQOs define the quality of services provided by the laboratory and are used in the quality assurance review of the field and laboratory data. Review of the quality control (QC) data against the DQOs determines if the data are fully usable, considered estimates, or rejected as unusable.

Quantitative DQOs

The quantitative DQOs for this project include reporting limits, precision, accuracy, and completeness.

Reporting Limits.

Reporting limits are determined by laboratory-provided or method-specified minimum levels, or by interim minimum levels where reporting limits at or near water quality criteria are not obtainable. Individual analyte reporting limits are listed in Table 4.

Precision.

Precision is the ability to replicate the measurement. It is expressed as Relative Percent Difference (RPD). Acceptance criteria for RPD are analysis-specific and are defined by the laboratories. RPD is normally determined by matrix spike duplicates or by laboratory-fortified blank duplicates. The calculation for RPD is:

$((X_1 - X_2) / ((X_1 + X_2)/2))*100$,

and is expressed as a percent. X_1 = first sample measurement and X_2 = second sample measurement. Precision limits for specific analytes are listed in Table 4.

Accuracy.

Accuracy is the closeness of the measurement to the true level of the variable. Accuracy is expressed as percent recovery (%R). Acceptance criteria for %R vary depending on the method. %R is normally determined by the use of known traceable laboratory control standards. Acceptance limits for accuracy for each analyte are listed in Table 4.

Completeness.

Completeness is a measure of how many planned measurements for each constituent actually resulted in usable data. It is expressed as a percentage of the total number of samples collected. The completeness criterion for this project is 80 percent. Because of the variety of vessels and discharges sampled, and the possibility for weather or other shipping-related delays resulting in missed holding times, a completeness criterion of less than 100% is to be expected.

Qualitative DQOs

The qualitative DQOs are representativeness and comparability.

Representativeness.

Representativeness is a measure of how well the sample reflects the typical wastewater effluent. Sample representativeness will be established by collecting cruise ship graywater, blackwater, and other wastewater discharge samples following vessel specific sampling plans (VSSP). The owner and operator is responsible for developing and submitting VSSPs to both agencies for each vessel participating in the program

The treatment system effluent will be considered representative for the two unannounced samples only if the vessel normally discharges continuously. If the vessel normally stores the wastewater in holding tanks before discharging, the effluent from the holding tank will be sampled. The VSSP is designed to ensure that consistent sampling methods are followed and that samples are collected from appropriate and representative locations at appropriate times.

Vessel operation that differs from the VSSP may result in State of Alaska rejection of samples.

Comparability.

Comparability is a measure of confidence with which one data set can be compared to another. It is addressed in the plan by 1) following EPA standardized sampling and analytical methods; 2) by using similar sampling and analytical methods as followed in last year's monitoring project; 3) ensuring that appropriate reporting limits are used; and 4) obtaining data of known and acceptable quality through the use of specified QC measures and QA data assessment.

Because of the different source types found on different vessels (e.g., a holding tank on some ships may contain both blackwater and graywater, while on others it may only contain graywater), careful definition of discharge types will be made in the VSSP. It is essential that these definitions be carried through to the end data user, as these differences could erroneously bias data interpretation.

The sampling team must make full use of ship records and logs, especially the Graywater and Sewage Discharge Record Book which includes the latitude and longitude at the beginning and end of discharge, identifying tanks, estimating volumes and calculating discharge rates (if any) at the time the sample is drawn. The vessel speed and longitude/latitude must be obtained by the sampler. Information added to the VSSP or changes to the VSSP during the sampling event must be recorded on the VSSP, COC, or in the field notes and must accompany the samples to the lab and be provided to the project data recipients as part of the complete report.

Special Training Requirements/Certification

Samplers will be trained in sampling methods, sample handling, chain of custody, and field measurements as outlined in 40 CFR 136. Additionally, samplers will receive appropriate training through their employer or their employer's designee, in any necessary shipboard safety procedures.

Laboratories used will have a current Alaska Department of Environmental Conservation Drinking Water certification. Laboratory analysts will be trained in accordance with each laboratory's QA Plan and Standard Operating Procedures (SOPs). Records of current certification, analyst training, and the laboratory QA documents listed above will be made available to the Project Manager and the Project QA Officer, and ADEC upon request. Laboratories will employ approved methods of testing as outlined in 40 CFR 136.

Documentation and Records

Sample schedule and Vessel/Sample Identification

The sampling team will work with the USCG and ADEC to develop a schedule of unannounced sampling events as required in 33 CFR 159.317 (a). The sampler must also notify the ADEC of its intent to sample at least 36 hours prior to sample collection. The two sampling events must be a minimum 21 days apart unless being conducted as allowed under 18 AAC 69.070.

Samples will be identified clearly on the chain of custody and sample bottles. For example, a sample from the Laundry Graywater from the *M/V Hypothetica* will be identified as "Laundry Graywater," as the description with associated dates and times. The Sample ID should clearly state where the sample was taken. For example, a sample taken from the #3 Center Double Bottom Tank should have DB#3C as its sample ID. Holding tanks should be HT. Collection tanks should be labeled CT. All samplers should use the

same sample ID system. From continuous discharges with one discharge point WW-1 is appropriate.

Field Records

Field notes will be collected in bound field notebooks with numbered pages. On-board staff will witness the sampling and will initial the field notes. Included in the field notes for each sample are:

- Vessel name (e.g., *Hypothetica*),
- Sampling personnel,
- Shipboard assistants,
- Photos and description of sample ports,
- Sample date and times,
- Field measurements: pH, chlorine residual, and temperature,
- Records on discharge flow rates and holding tank volumes,
- Samples collected,
- Nature of sample: Composite or Grab,
- Waste type: blackwater, graywater, or mixed,
- Deviations from VSSP and/or QA/QCP,
- Unusual conditions and explanation of data anomalies,
- Latitude/longitude and speed at time of discharge being sampled,
- Copy of the Discharge record for the sampled discharge.

Cruise ship operators maintain a sewage and graywater discharge record book that records the date, times, volumes, and vessel location (latitude and longitude) for each wastewater discharge. These records will be provided to the sampler. The sampler will transcribe relevant information from the record book to the sample data sheets as an aid to subsequent determination of conventional and priority pollutant mass input. This information will also be included in final laboratory reports.

Laboratory Records

Upon completion of laboratory analysis, laboratory data review, and data validation, the laboratory will issue a full report in an electronic format describing the results of analysis for each sample submitted. Prior to issuance of the analytical report to the vessel's representatives, ADEC, and the COTP, the laboratory's QA manager will review and approve the report.

The laboratory will identify whether a sample was taken to satisfy 33 CFR 159.317 and AS 46.03.465 or done in order to seek USCG approval for discharge without distance or speed limitations.

Components of the analytical report include:

- A short summary sheet discussing the sampling event and results.
- Sample information: ship name, sample names, waste type, date and time collected.
- Parameter name and method reference.
- Analytical result.
- Method Detection Limit.

- Practical Quantitation Limit (reporting limit).
- Date and time of sample preparation and date and time of analysis.
- Quality control information: blank results, spiked blank or laboratory control standard recovery, matrix spike/spike duplicate recoveries, relative percent differences between duplicate spike analyses.
- Chain of custody.
- Holding times met or not.
- Case Narrative of deviations from methods, procedural problems with sample analysis, holding time exceedances, and any additional information that is necessary for describing the sample. This narrative should explain when results are outside the precision and accuracy required and the corrective actions taken to rectify these QC problems.
- Discharge logs and field notes.
- Latitude and longitude information pertaining to each sample including which overboard port the waste was discharged through and the speed the vessel was traveling.
- Explanation of data abnormalities.
- *(FOR ADEC ONLY) If applicable, a notification that this sample is a resample under 18 AAC 69.070*

Chain of Custody

The original chain of custody form will accompany the sample to the laboratory. When portions of the sample are sent to another laboratory (e.g., for many of the priority pollutants), a copy of the chain of custody will be made and this will accompany the samples. At each transfer of the sample, the transfer will be indicated on the chain of custody form. The person listed on the Chain of Custody should have full sight or control of the sample at all times until it the COC is relinquished by that person and received by the next party signed on the COC.

A copy of the original chain of custody will be included with the final report.

Sampling Process Design

A vessel specific sampling plan (VSSP) will be developed for each ship by the ship engineers and submitted to the sampling team 30 days prior to entry into Alaska waters. The plan will include, as a minimum, the following:

- Vessel name.
- Passenger and crew capacity of ship.
- Daily water use per individual.
- Locations and capacities for treated sewage, graywater, and other wastewater tanks.
- Type of wastewater treatment systems.
- Each discharge pump type and rate
- Vessel schematic of discharge ports and corresponding sampling ports. **The sample port must be no more than 50 feet from the OVERBOARD port.**
- Description of discharges, including anticipated flow rates and tank volumes.
- Table containing type of discharge, type of sample (grab or composite), parameters (conventional or priority pollutants), location on the vessel where each sample is to be collected, and special circumstances.

- A narrative description of the time at which each sample is to be taken based upon circumstances that will yield a sample most likely to be representative of the average discharge that passes through the location where the sample is taken
- A description of the standards the owner or operator will use to determine a deviation from the plan
- Equipment required.

Each VSSP will be dated and a copy will be provided to the Project Manager, the cruise ship companies, Alaska Department of Conservation and the U.S. Coast Guard. The VSSP will be submitted to the COTP and the ADEC Project Manager within 30 days of each vessel's initial entry into the applicable waters of Alaska. The ADEC must approve the VSSP prior to sampling. After the first sampling event on a vessel, the VSSP may be updated. If it is updated, copies of the updated sampling plan will also be provided to the Project Manager, the vessel's owner or operator, ADEC and the U.S. Coast Guard before the second round of sampling occurs.

The purpose of providing the VSSP to the Project Manager and the cruise ship companies prior to sampling is to provide certainty that consistent sampling methods are followed and that samples are collected from appropriate and representative locations. Deviations from the sampling plan may well occur; these will be noted in the field notes.

Sampling Method Requirements

Sample Collection Procedures

Specific sampling techniques for each vessel will be detailed in the VSSP. The following general guidelines are listed to provide consistency among the vessels utilizing this QA/QCP.

Samples will reflect a representative discharge of treated blackwater, graywater and other wastewaters into applicable waters of Alaska from an operable marine sanitation device, other treatment system, a holding tank or some combination as specified in the VSSP. In port sampling, in compliance with ADEC sampling events, will be conducted only if the vessel is certified to discharge in port. If samples must be taken while the ship is underway, care will be taken to assure sample representativeness and homogeneity. See VSSP for further details on sampling.

A volume of water equal to at least ten times the volume of the sample discharge line will first be discharged into a bucket or similar container to clear the line of standing water and possible contamination.

Samplers will work in teams of two for sampling events that must be performed while the vessel is underway to ensure that proper sampling techniques are followed and adequate notes are taken during the sampling event. One sampler will be sufficient for all in-port sampling events.

Samplers will wear disposable gloves, tyvek suit and safety eyewear and will observe precautions while collecting samples, remaining aware of the potential biohazard present.

Samplers will take care not to touch the insides of bottles or lids/caps during sampling.

Samples will be listed as "grab" on the Chain of Custody form.

Bottles will be pre-cleaned and will not require rinsing with sample. When sample bottles are pre-preserved, bottles must never be rinsed but will be filled only once with sample.

Samples will be cooled immediately in an ice-water bath to 4° C and then placed into a cooler containing frozen blue ice or ice and water mixture to maintain a sample temperature of 4 +/-2° C. Temperature will be measured and recorded at the time of sample collection and a note shall be made of the temperature of the cooler contents upon arrival at the laboratory.

Sample bottles will be filled sequentially. Bottles will normally be filled to the shoulder of the bottle, leaving a small space for expansion and mixing. VOC bottles will be filled leaving a convex meniscus at the top of the bottle, with no air bubbles present; when the VOC lid is screwed on a small volume of water will be displaced and no air will be present in the bottle. Filtering of dissolved metals will be performed immediately upon receipt at the laboratory followed by preservation through acidification.

TABLE 1 Sample Containers, Preservations, Holding Times, and Sample Types

LAB PARAMETER	CONTAINER	PRESERVATION	HOLDING TIME	Grab or Composite	Sample Timing/ Collection
Conventional Pollutants					
Total Suspended Solids	From BOD bottle	4° C	7 days	Grab Only	Dependent upon vessel (see individual vessel sampling plan)
Settleable Solids	1 liter HDPE, white label	4° C	48 hours	Grab Only	
Biochemical Oxygen Demand	1 liter HDPE, white label	4° C	48 hours	Grab Only	
Ammonia – Total	250 ml HDPE, yellow label	H_2SO_4, pH <2, 4° C Lab pre-preserved	28 days	Grab Only	
Chemical Oxygen Demand	From ammonia bottle	H_2SO_4, pH <2, 4° C Lab pre-preserved	28 days	Grab Only	
Specific Conductance	From BOD bottle	4° C	28 days	Grab Only	
Fecal Coliforms	100 ml sterile plastic	Sodium Thiosulfate, 4° C	6 hours	Grab Only	
Alkalinity	From BOD bottle	4° C	14 days	Grab Only	

LAB PARAMETER	CONTAINER	PRESERVATION	HOLDING TIME	Grab or Composite	Sample Timing/ Collection
pH	100 ml HDPE and from BOD bottle	4° C	ASAP In field and lab	Grab Only	
Oil and Grease	1 liter glass	H_2SO_4, pH <2, 4° C Lab pre-preserved	28 days	Grab Only	
Total Organic Carbon	2 40-ml VOC vials	H_2SO_4, pH <2, 4° C Lab pre-preserved	28 days	Grab Only	
Total Nitrogen	500 ml HDPE, yellow label	H_2SO_4, pH <2, 4° C Lab pre-preserved	28 days	Grab Only	
Total Phosphorus	From ammonia bottle	H_2SO_4, pH <2, 4° C Lab pre-preserved	28 days	Grab Only	
Temperature	From pH Bottle	N/A	ASAP in field	Grab Only	
Chlorine Residual	From pH bottle	N/A	ASAP In field	Grab Only	
Priority Pollutants					
BNA	1 liter glass	4° C; Sodium Thiosulfate if residual chlorine is present.	7 days until extraction	Grab Only	Dependent upon vessel (see individual vessel sampling plan)
VOCs	3 40-ml VOC vials	HCl, 4° C; Sodium Thiosulfate if residual chlorine is present	14 days until analysis	Grab Only	
Total Recoverable Metals	500 ml HDPE	HNO_3, pH <2, 4° C	28 days Hg/ 6 mos. Others	Grab Only	
Dissolved Metals	500 ml HDPE	Filtration w/0.45 micron filter, HNO_3, pH <2	6 months	Grab Only	

Sample containers will normally be pre-preserved by the laboratory. If chlorine residual is detected during field measurement of chlorine, sodium thiosulfate provided by the lab will be added in the field to the BNA and PCB sample bottles until no chlorine is detected. The lab will provide decanting bottles with sodium thiosulfate. When chlorine is detected, the sample will be added first to the decanting bottle, and then will be decanted into the VOC vials.

Sample Handling and Custody Requirements

Sample Custody

Samples and sample containers will be maintained in a secure environment, from the time the bottles leave the laboratory until the time the samples are received at the laboratory. The laboratories will maintain custody of bottles and samples using their normal custody procedures.

Blind field duplicates will be identified with discrete sampling labels and recorded as blind field duplicates in the sampler's field notebook.

To maintain the secure environment for samples on board ship and during transport, samples must be: 1) in the sampler's possession (line of sight); or 2) in a cooler sealed with signed and dated friable evidence tape on opposing sides of the cooler; or 3) in a locked cooler for which only the sampler has the key. When the cooler is sealed, the method of securing the samples must be such that tampering with samples or bottles is not possible: The cooler must be secured so that the lid cannot be removed without breaking the evidence tape or cutting the lock, so that tampering would be evident.

Transfer of samples will be accomplished using the laboratory's chain of custody form. When samples are transferred between personnel, such transfer will be indicated on the chain of custody form with signature, date and time of transfer. The chain of custody will remain with the samples, sealed inside the cooler, until received by the laboratory.

At any time during sample transfer, if custody is broken, a note must be made on the chain of custody form accompanying the sample. Upon receipt at the laboratory, the laboratory sample custodian will make note if a breach of custody has occurred (for example, if a custody seal has broken during transport).

Sample Temperature and Condition

Samples will be held at 4 +/-2° C. A 1 liter temperature blank will accompany all samples and will be measured at the laboratory upon receipt of the samples to verify the temperature. The temperature of this blank will be recorded on the chain of custody upon receipt of the sample at the lab.

To maintain the temperature, extra blue ice will be kept frozen on board ship or ship ice will be used. Blue ice or ship ice will be exchanged just before shipment of samples to the lab, and may be exchanged more frequently during the sampling trip, as required.

Some samples may be at a temperature near body temperature (37° C) at time of sample collection. This temperature encourages growth of fecal coliform bacteria and thus these samples must be cooled as quickly as possible, without freezing them. These samples shall be placed in a water bath containing ice cubes provided on board ship. The bottles should be immersed in the water to the shoulder, rotated frequently, and ice should be added/water drained off as the ice melts for at least one hour until the sample reaches a temperature of 4° C. To ensure custody of these samples that may not be able to be sealed in the cooler until the temperature is lowered, these bottles can be sealed with custody tape individually, as necessary.

In no event will samples be placed in refrigerators meant for human food or beverages.

Sample Holding Times

Sample holding times are as described in Table 1 above. Planned sample shipping schedules will allow for the meeting of these holding times.

The most critical holding time will be that of fecal coliforms, which is defined by EPA as 6 hours. To meet this holding time, a stringent scheduling effort will be required by the laboratory and sampling team. If the normal discharge pattern is altered in order to adhere to this holding time, a note will be made of the change in the field notes and in the final quality control review.

Sample Disposal

Samples collected for analysis shall be held by the laboratory for not less than six months from the sample collection date, or as directed by the Coast Guard and ADEC.

Analytical Methods and Quality Control Requirements

The USCG requires the analytical report within 15-days after the sampling date for conventional pollutant analyses. The USCG requires the analytical report within 30-days from the sampling date. The ADEC requires conventional and priority pollutants reports within 21 days of completion of laboratory analysis.

The MDL referred to in Table 2 is a statistically derived method detection limit, typically arrived at by repeat analyses performed by the laboratory, with a statistical EPA-defined calculation then performed (40 CFR 136 Appendix B). It is sometimes method-defined (as in, BOD). The PQL (Practical Quantitation Limit) is the level at which the laboratory QA department feels comfortable reporting data. Because the MDL is statistically derived, data can be detected at and near the MDL that are not accurate and that are frequently false positives. For this reason, many labs do not report at the MDL but report at some level, often approximately 3 times greater than the MDL (again, for statistical purposes). The MDL's and Reporting Limits are usually laboratory-specific standards and are not tied to compliance limits, and are not regulatory action levels. The MDL and PQL values in this document reflect typical laboratory performance at the present time. Current guidelines for MDL's, RL's (minimum levels, PQL), and precision and accuracy requirements for the project are as follows:

Table 2. ANALYTICAL METHODS AND QUALITY CONTROL REQUIREMENTS

LAB PARAMETER	METHOD*	MDL (mg/l)	Reporting Level Minimum Level (mg/l)	PRECISION (RPD)	ACCURACY (% Recovery)
Conventional Pollutants					
Ammonia – Total	350.3	0.03	0.10	<20%	85 - 115 %
Biochemical Oxygen Demand	405.1	2	2	<20%	80 - 120 %

LAB PARAMETER	METHOD*	MDL (mg/l)	Reporting Level Minimum Level (mg/l)	PRECISION (RPD)	ACCURACY (% Recovery)
Chemical Oxygen Demand	410.4	3	10	<20%	85 - 115 %
Chlorine Residual (total/free)	SM 4500 Cl-G	0.10	0.10	N/A	N/A
Alkalinity	SM 2320 B	0.5	2.0	<20%	85 - 115 %
pH	150.1	0.1 standard units	0.1 standard units	<20%	N/A
Settleable Solids	160.5	0.1 (ml/L)	0.1 (ml/L)	<20%	N/A
Total Suspended Solids	160.2	1.3	4	<20%	85 - 115 %
Fecal Coliforms	SM 9221E/SM9222 D	2 FC/100 ml	2 FC/100 ml	N/A	N/A
Specific Conductance	120.1	1 µmHos/cm	2 µmHos/cm	<20%	85 - 115 %
Total Organic Carbon	SM 5310 B	1.0	1.0	<20%	85 - 115 %
Oil and Grease	1664	1.5	5.0	<20%	66-144%
Total Nitrogen	EPA various	1.0	1.0	N/A	N/A
Total Phosphorus	EPA 365.2	0.01	0.05	<20%	85 - 115 %
Priority Pollutants					
Total Recoverable Metals		**µg/l**	**µg/l**		
Antimony	200.8	0.15	0.5	<20%	80 - 120 %
Arsenic	200.8	0.15	0.5	<20%	80 - 120 %
Beryllium	200.8	0.15	0.5	<20%	80 - 120 %
Cadmium	200.8	0.15	0.5	<20%	80 - 120 %
Chromium	200.8	0.15	0.5	<20%	80 - 120 %
Copper	200.8	0.15	0.5	<20%	80 - 120 %
Lead	200.8	0.15	0.5	<20%	80 - 120 %
Mercury (Total)	245.1	0.15	0.5	<20%	80 - 120 %
Nickel	200.8	0.15	0.5	<20%	80 - 120 %
Selenium	200.8	0.15	0.5	<20%	80 - 120 %
Silver	200.8	0.15	0.5	<20%	80 - 120 %
Thallium	200.8	0.15	0.5	<20%	80 - 120 %
Zinc	200.8	0.15	0.5	<20%	80 - 120 %
Dissolved Metals					
Antimony	200.8	0.15	0.5	<20%	80 - 120 %
Arsenic	200.8	0.15	0.5	<20%	80 - 120 %
Beryllium	200.8	0.15	0.5	<20%	80 - 120 %
Cadmium	200.8	0.15	0.5	<20%	80 - 120 %

LAB PARAMETER	METHOD*	MDL (ug/l)	Reporting Level Minimum Level (ug/l)	PRECISION (RPD)	ACCURACY (% Recovery)
Chromium	200.8	0.15	0.5	<20%	80 - 120 %
Copper	200.8	0.15	0.5	<20%	80 - 120 %
Lead	200.8	0.15	0.5	<20%	80 - 120 %
Nickel	200.8	0.15	0.5	<20%	80 - 120 %
Selenium	200.8	0.15	0.5	<20%	80 - 120 %
Silver	200.8	0.15	0.5	<20%	80 - 120 %
Thallium	200.8	0.15	0.5	<20%	80 - 120 %
Zinc	200.8	0.15	0.5	<20%	80 - 120 %
VOCs					
Acrolein	624	20	100	<20%	50-120%
Acrylonitrile	624	2	10	<20%	60-140%
Benzene	624	0.5	2	<20%	80-120%
Carbon Tetrachloride	624	0.5	2	<20%	80-120%
Chlorobenzene	624	0.5	2	<20%	80-120%
1,2-Dichloroethane	624	0.5	2	<20%	80-120%
1,1,1-Trichloroethane	624	0.5	2	<20%	80-120%
1,1-Dichloroethane	624	0.5	2	<20%	80-120%
1,1,2-Trichloroethane	624	0.5	2	<20%	80-120%
1,1,2,2-Tetrachloroethane	624	0.5	2	<20%	80-120%
Chloroethane	624	0.5	5	<20%	62-133%
Chloroform	624	0.5	2	<20%	80-120%
1,1-Dichloroethene	624	0.5	2	<20%	74-140%
Trans 1,2-Dichloroethene	624	0.5	2	<20%	80-120%
1,2-Dichloropropane	624	0.5	2	<20%	80-120%
1,1-Dichloropropene	624	0.5	2	<20%	80-120%
Ethylbenzene	624	0.5	2	<20%	80-120%
Methylene Chloride	624	1.0	5	<20%	60-140%
Chloromethane	624	1.0	5	<20%	60-140%
Bromomethane	624	1.0	5	<20%	51-131%
Bromoform	624	0.5	2	<20%	80-120%
Bromodichloromethane	624	0.5	2	<20%	80-120%
Dibromochloromethane	624	0.5	2	<20%	80-120%
Tetrachloroethene	624	0.5	2	<20%	80-120%
Toluene	624	0.5	2	<20%	80-120%
Trichloroethene	624	0.5	2	<20%	80-120%
Vinyl Chloride	624	0.5	2	<20%	60-140%
2-Chloroethyl Vinyl Ether	624	2.0	10	<20%	60-140%
1,1,1,2-Tetrachloroethane	624	0.473	2	<20%	79-124%
1,2,3-Trichlorobenzene	624	0.143	2	<20%	75-125%

1,2,3-Trichloropropane	624	0.605	2	<20%	80-120%
1,2,4-Trichlorobenzene	624	0.439	2	<20%	75-125%
1,2,4-Trimethylbenzene	624	0.478	2	<20%	75-125%
1,2-Dibromo-3-Chloropropane	624	0.323	10	<20%	70-130%
1,2-Dichlorobenzene	624	0.513	2	<20%	75-125%
1,2-Dichloroethane	624	0.368	2	<20%	84-128%
1,3,5-Trimethylbenzene	624	0.481	2	<20%	70-130%
1,3-Dichlorobenzene	624	0.546	2	<20%	76-124%
1,3-Dichloropropane	624	0.470	2	<20%	78-130%
1,4-Dichlorobenzene	624	0.648	2	<20%	78-119%
2,2-Dichloropropane	624	0.438	2	<20%	60-130%
2-Butanone	624	1.5	50	<20%	60-140%
2-Chlorotoluene	624	0.569	2	<20%	76-131%
2-Hexanone	624	0.461	20	<20%	64-139%
4-Chlorotoluene	624	0.63	2	<20%	77-127%
4-Isopropyltoluene	624	0.547	2	<20%	76-122%
4-Methyl-2-Pentanone	624	0.364	20	<20%	67-135%
Acetone	624	3.2	50	<20%	44-152%
Bromobenzene	624	0.492	2	<20%	79-126%
Bromochloromethane	624	0.555	2	<20%	75-133%
Carbon Disulfide	624	0.456	2	<20%	68-128%
Cis-1,2-Dichloroethene	624	0.467	2	<20%	82-128%
Cis-1,3-Dichloropropene	624	0.394	2	<20%	80-127%
Dibromomethane	624	0.41	2	<20%	83-128%
Dichlorodifluoromethane	624	1.5	5	<20%	60-140%
Hexachlorobutadiene	624	0.495	2	<20%	50-131%
Iodomethane	624	1.1	5	<20%	52-146%
Isopropylbenzene	624	0.481	2	<20%	73-127%
m&p Xylenes	624	0.276	2	<20%	76-119%
Naphthalene	624	0.31	2	<20%	70-130%
n-Butylbenzene	624	0.462	2	<20%	70-130%
n-Propylbenzene	624	0.501	2	<20%	70-130%
O-Xylene	624	0.463	2	<20%	84-123%
sec-Butylbenzene	624	0.521	2	<20%	72-123%
Styrene	624	0.577	2	<20%	85-124%
tert-Butyl Methyl Ether	624	0.356	2	<20%	71-130%
tert-Butylbenzene	624	0.431	2	<20%	73-125%
trans-1,3-Dichloropropene	624	0.392	2	<20%	82-126%
trans-1,4-Dichloro-2 Buten	624	0.856	10	<20%	70-130%
Trichlorofluoromethane	624	0.509	2	<20%	50-118%

Trichlorotrifluoroethane	624	0.603	2	<20%	60-140%
LAB PARAMETER	**METHOD***	**MDL (ug/l)**	**Reporting Level Minimum Level (ug/l)**	**PRECISION (RPD)**	**ACCURACY (% Recovery)**
Vinyl Acetate	624	0.66	5	<20%	60-140%
BNA					
Acenaphthene	625	1.0	5	<40%	48-121%
Benzidine	625	50	200	<40%	30-170%
1,2,4-Trichlorobenzene	625	1.0	5	<40%	40-104%
Hexachlorobenzene	625	1.0	5	<40%	57-142%
Hexachloroethane	625	1.0	5	<40%	60-140%
Bis (2-chloroethyl) ether	625	1.0	5	<40%	38-124%
2-Chloronapthalene	625	2.0	10	<40%	30-170%
1,2-Dichlorobenzene	625	1.0	5	<40%	32-120%
1,3-Dichlorobenzene	625	1.0	5	<40%	60-140%
1,4-Dichlorobenzene	625	1.0	5	<40%	25-92%
3,3'-Dichlorobenzidine	625	5.0	20	<40%	30-170%
2,4-Dinitrotoluene	625	1.0	5	<40%	51-132%
2,6-Dinitrotoluene	625	1.0	5	<40%	34-146%
1,2-Diphenylhydrazine	625	1.0	5	<40%	60-140%
Fluoranthene	625	1.0	5	<40%	51-140%
4-Chlorophenyl Phenyl ether	625	1.0	5	<40%	53-143%
4-Bromophenyl Phenyl ether	625	1.0	5	<40%	53-138%
Bis (2-Chloroisopropyl) ether	625	1.0	5	<40%	60-140%
Bis (2-Chloroethoxy) methane	625	1.0	5	<40%	48-122%
Hexachlorobutadiene	625	1.0	5	<40%	60-140%
Hexachlorocyclopentadiene	625	2.0	10	<40%	30-170%
Isophorone	625	1.0	5	<40%	46-118%
Napthalene	625	2.0	10	<40%	45-136%
Nitrobenzene	625	1.0	5	<40%	46-114%
N-Nitrosodimethylamine	625	1.0	5	<40%	30-170%
N-Nitrosodi-N-Propylamine	625	1.0	5	<40%	39-130%
N-Nitrosodiphenylamine	625	2.0	10	<40%	60-140%
Bis (2-Ethylhexyl) Phthalate	625	1.0	5	<40%	56-125%
Butyl Benzyl Phthalate	625	1.0	5	<40%	55-123%
Di-N-Butyl Phthalate	625	1.0	5	<40%	60-160%

Di-N-Octyl Phthalate	625	1.0	5	<40%	60-140%
Diethyl Phthalate	625	1.0	5	<40%	57-131%
Dimethyl Phthalate	625	1.0	5	<40%	61-123%
Benzo (A) Anthracene	625	1.0	5	<40%	58-118%
Benzo (A) Pyrene	625	1.0	5	<40%	40-138%
Benzo (B) Fluoranthene	625	1.0	5	<40%	41-133%
Benzo (K) Fluoranthene	625	1.0	5	<40%	60-160%
Chrysene	625	1.0	5	<40%	55-139%
Acenaphthylene	625	1.0	5	<40%	48-133%
Anthracene	625	1.0	5	<40%	59-131%
Benzo (g,h,i) Perylene	625	1.0	5	<40%	50-125%
Fluorene	625	1.0	5	<40%	58-130%
Phenanthrene	625	1.0	5	<40%	54-140%
Dibenzo (a,h) Anthracene	625	1.0	5	<40%	50-129%
Indeno (1,2,3-CD) Pyrene	625	1.0	5	<40%	48-125%
Pyrene	625	1.0	5	<40%	46-135%
2,4,6-Trichlorophenol	625	1.0	5	<40%	56-129%
4-chloro-3-methylphenol	625	1.0	5	<40%	49-117%
2-Chlorophenol	625	1.0	5	<40%	38-124%
2,4-Dichlorophenol	625	1.0	5	<40%	55-130%
2,4-Dimethylphenol	625	5.0	25	<40%	58-128%
2-Nitrophenol	625	1.0	5	<40%	52-111%
4-Nitrophenol	625	25	100	<40%	14-122%
2,4-Dinitrophenol	625	25	100	<40%	53-109%
4,6-Dinitro-2-methylphenol	625	5.0	25	<40%	43-128%
Pentachlorophenol	625	1.0	5	<40%	37-112%
Phenol	625	1.0	5	<40%	60-140%
2,4,5-Trichlorophenol	625	0.287	5	<40%	60-140%
2-Chloronaphthalene	625	0.734	10	<40%	30-170%
2-Methylnaphthalene	625	0.251	5	<40%	44-136%
2-Methylphenol	625	0.423	5	<40%	53-113%
2-Nitroaniline	625	0.390	100	<40%	54-114%
3&4-Methylphenol	625	0.558	5	<40%	33-125%
3-Nitroaniline	625	0.467	50	<40%	30-170%
4-Chloroaniline	625	0.576	5	<40%	30-170%
4-Chlorophenyl methylsulfone	625	0.325	20	<40%	30-170%
4-Nitroaniline	625	0.305	50	<40%	46-140%
Benzoic Acid	625	23	130	<40%	30-170%
Benzyl Alcohol	625	0.599	10	<40%	60-140%
Dibenzofuran	625	0.309	5	<40%	53-130%

*EPA methods in "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency, Environmental Monitoring Systems Laboratory - Cincinnati (EMSL-CI), EPA-600/4-79-020, Revised March 1983 and 1979 where applicable. http://www.epa.gov/cgi-bin/claritgw?op-Display&document=clserv:ORD:0167;&rank=4&template=epa
*SM methods in "Standard Methods for the Analysis of Water and Wastewater," 18th or more recent Edition, APHA/AWWA/WEF.
*Four digit numeric methods are from *EPA Test Methods for Evaluating Solid Wastes. Physical/Chemical Methods (SW-846).* 3rd Edition Update 2B, January 1995.

Instrument/Equipment Testing, Inspection, and Maintenance Requirements; Calibration and Frequency

Field instruments include a pH paper test kit, chlorine residual color wheel test kit, and a thermometer.

Maintenance of the chlorine residual test kit includes keeping the sample cell rinsed after sample measurement, keeping the cell clean and free of fingerprints and oils, and keeping the color wheel itself clean. An extra cell will be kept with the test kit in case of breakage or scratches to the sample cell. The field kit should be checked against the lab kit twice per season.

The analysis of pH in the field will be used for reference purposes only and will be verified through laboratory analysis. A pH test strip kit shall be used that ensures the most accurate reading possible in the expected range of pH values. The laboratory will supply reference buffers to the sampling team for field verification.

Temperature at or shortly after sample collection will be measured using either a temperature probe or with an independent thermometer. The validity of the temperature probe will be checked early and late in the season against a NIST certified thermometer at a certified laboratory; differences between the temperature probe and the certified thermometer will be documented in the final quality assurance review of the data.

The temperature, pH, and chlorine certification must be submitted to ADEC Project Manager by May 31st and again by July 31st of each year that the QA/QC plan is valid.

Laboratory instrument and calibration procedures are detailed in the QA Plans and SOPs from the certified laboratories. Copies of these plans are available upon request from the lab managers or from the Project QA Officer.

Inspection/Acceptance Requirements for Supplies and Consumables

Sample bottles will be visually inspected prior to sampling. If problems with bottles are noted, such as a cap that has fallen off an empty bottle, note of the problem will be made on the chain of custody form.

Inspection/Acceptance Requirements (Non-Direct Measurements)

Historical data for this project includes only 4 years of monitoring, so data acceptance criteria will not be required for historical data acceptance.

On-board ship data to be recorded includes tank volume and pumping rate data from ship tracking systems and any documented occurrence of seawater influx. The data will be recorded as reported by shipboard staff in the Graywater and Blackwater Discharge Record Book and through direct observation by the sampling team.

Data Management

Data Management includes accurate field notebook entries, completed Chain-of-Custody forms and laboratory data management documents. Laboratory data management procedures and processes are described in the Laboratory's Quality Management Plan. (This document is kept on file by the ADEC WQA Officer.)

The Project Manager will report data directly to the Coast Guard, the ADEC Project Manager and the individual cruise lines after thorough review by the laboratory QA Manager within the regulatory time limits.

The Project Manager will not be placed in the position of determining whether an analytical result represents a violation of federal or state laws or regulations.

ASSESSMENT/OVERSIGHT

Assessments and Response Actions

Field Assessments

The **Project QA Officer** will perform a field sampling audit on a minimum of two **randomly selected sampling events** during the project in order to evaluate the performance of the sampling team. The Project QA Officer must notify ADEC 36 hours prior to the audit in order to observe if desired. Follow-up field audits may be necessary pending audit findings. The initial field sampling audit will be conducted within 30 days of project initiation, with the second audit occurring midway through the project. Each audit will concentrate on sampling technique, sample handling, field records, field testing methods, and adherence to vessel specific sampling plans and the QA/QCP. These reports are due within 14 days of the audit. This report will be provided to the Project Manager, ADEC Project Manager and the USCG for evaluation and corrective action, if necessary. The USCG and ADEC may also participate in random onboard field assessments of the sampling effort. The Project QA Officer and Project Manager will be advised in a timely manner of the results of each USCG or ADEC onboard field assessment.

Laboratory Assessments

Laboratories are subject to periodic and extensive audits by regulatory agency personnel as part of their certification. Reports of these audits will be made available to the DEC Project

Manager, ADEC Water Quality Assurance Officer, and the Project QA Officer. The Project QA Officer will review any recent and pertinent technical systems audit reports of the analytical laboratories involved in this project.

The Project QA officer will use technical system audit report findings and recommendations to design an on-site technical systems audit of the project laboratories (in consultation with and support from technical experts at ADEC). The unannounced technical systems audit must be performed within the first 30 days of project initiation so any recommended enhancements to laboratory operations can be implemented early on in the project. The Project QA Officer must notify the ADEC Project manager within 36 hours of the audit date to give the ADEC the opportunity to observe if desired. The ADEC may perform additional lab audit of the commercial passenger vessel samples.

Based upon review of past lab audits, the Project QA Officer may recommend that a technical systems audit is not warranted. If the ADEC Project Manager disagrees, the technical audit must be performed.

The ADEC Project Manager and ADEC Water Quality Assurance Officer will be notified in advance and invited to participate in any audit, and a report of these findings will be presented to the ADEC Project Manager and the Lab Project Manager. Any deficiencies noted by the auditor will be corrected immediately, and the Lab Manager will note these changes in a corrective action report to the Project QA Officer and ADEC Project Manager. The Project QA Officer will also perform a technical systems audit on two sampling events in order to evaluate laboratory log-in, sample handling, preservation, and storage procedures.

Duplicates

Blind sample duplicates will be collected on a minimum of 10% of the total number of samples or four samples total, whichever number is greater. All will be analyzed for conventional pollutants, but only half will be analyzed for priority pollutants. The purpose of the blind sample duplicates is to assess sampling and laboratory error and to assess overall method variability. Precision between the sample and its duplicate will be determined by calculating the relative percent difference between the two samples, in the same way that precision is measured between two laboratory-fortified blanks or a matrix spike/matrix spike duplicate. The use of duplicate samples extends the test of precision to the sampling method itself. The use of blind samples provides a test of the laboratory and is used to assess bias or analytical errors not detected by the laboratory (e.g., a false positive). The samples will be analyzed by the same lab and for the same parameters. Results of the duplicate analysis will be monitored by the Project QA Officer and submitted to the ADEC Project Manager.

In addition, the ADEC QA Officer may conduct a laboratory performance audit. The ADEC may submit a sample that contains a known concentration of analytes prepared and certified by a different laboratory. The ADEC will compare the results from the lab from the certified sample results to determine the laboratory performance. ADEC funds pay for this performance audit.

The ADEC may submit two trip blank samples over the course of the sampling season. The trip blanks check to see if any outside contamination occurs during the sampling and analyzing process. ADEC funds pay for the performance audit.

Corrective Action

The laboratory or sampling manager will notify the Project QA Officer and ADEC project manager, if errors are noted by the laboratory or sampling personnel. The Project QA Officer will then notify the Lab Project Manager and the party responsible for the error of the deficiency, and will recommend methods of correcting the deficiency. The responsible party will then immediately correct the problem and will send those corrections via email to the Project QA Officer, the Lab Project Manager, and ADEC Project Manager. The Project QA Officer will conduct a follow-up assessment to ensure recommended corrective actions are routinely being followed.

Reports to Management

The Project QA Officer will issue audit reports in accordance with the following guidelines:

- Field sampling audits--Verbal on-site debriefing of audit findings to sampling personnel. Draft field audit report issued to sampling personnel and Lab Project Manager within one week of audit. Final audit report to Lab Project Manager and ADEC Project Manager within 2 weeks of end of audit. The Lab Project Manager will forward all corrective action reports to the ADEC Project Manager when completed.
- Technical laboratory audit—Verbal on-site debriefing of audit findings to laboratory personnel, and Lab Project Manager. Draft technical systems audit report to Lab Project Manager and ADEC Project Manager within 1-2 weeks of end audit (depending upon depth and extent of audit). Final technical systems audit report to Lab Project Manager and ADEC Project Manager within 2 – 4 weeks of end of audit (depending upon depth and extent of audit). Lab Project Manager will forward all corrective action reports to the ADEC Project Manager when completed.
- Blind duplicate samples—Draft report findings within one week of receiving/verifying results to Laboratory QA officer, Project Manager, and ADEC Project Manager.

At project conclusion, the Project QA Officer will issue an overall Quality Assurance Project Report to the USCG, ADEC Project Manager and ADEC Water Quality Assurance Officer, and vessel representatives detailing findings, problems and resolutions, data reliability and recommended enhancements for future monitoring projects, etc.

The ADEC Project Manager will submit the results of the any QA/QC audit reports to the Lab Project Manager and Laboratory Manager.

DATA VALIDATION AND USABILITY

Data Review, Verification, and Validation

During the project, the Project QA Officer will review at least 20% of field notes and laboratory data packages to detect correctable problems for the remainder of the study. The first data review must be submitted by June 15 of each year in order to correct any system problems early in the season. The other data reviews must be equally spaced throughout the season. Upon receipt of these completed data packages from the Project Manager, the Project Quality Assurance Officer will review data and field notes to verify that this QA/QCP was followed. Items reviewed will include:

- Comparison of dated vessel specific sampling plans with the QA/QCP to assure that the correct samples were taken.
- Comparison of dated sampling plans with field notes and custody forms to assure that planned samples were collected.
- Review of field notes and data to assure that information specified in the QA/QCP has been recorded.
- Review of laboratory data packets, particularly the QA/QC laboratory sheets.

Any problems noted will be immediately brought to the attention of the Lab Project Manager who will take appropriate corrective action as necessary. The ADEC Project Manager will also be notified. This data review must be completed and submitted to the ADEC within 40 days of the sampling event. Any review made outside the date will not be accepted.

Reconciliation with Data Quality Objectives

The Project QA Officer will reconcile the data from this project with the requirements defined in this document following the validation and verification methods stated above. If an overall assessment of these elements cannot ensure that the data are of sufficient quality to meet objectives, then additional evaluation of raw data will be performed.

BIBLIOGRAPHY

Documents referenced during the preparation of this document include:

1. April 13 *Alaska Cruise Ship Initiative Wastewater Work Group Protocol for Voluntary Wastewater Monitoring Program in 2001*.
2. July 27, 2000 *Cruise Ship Wastewater Monitoring Southeast Alaska 2000 Quality Assurance Project Plan*
3. *EPA Requirements for QA Project Plans (QA/R-5)*, EPA/240/B-01/003 March 2001.
4. US Code of Federal Regulations; including 33 CFR 159.
5. *Water Quality Standards Handbook, Second Edition*, EPA-823-B-94-005a, August 1994.
6. *Compilation of the U.S. Environmental Protection Agency's Water Quality Criteria for the Priority Toxic Pollutants*, ADEC, September 1997.